REMARKS

Claims 1-26 are all the claims pending in the application. All the claims are rejected under 35 U.S.C. § 112, first paragraph, and under 35 U.S.C. § 103(a) as being unpatentable over Marks (US Patent No. 6,025,847) in view of Asar (US Patent No. 6,477,266) and further in view of Crandall et al (US Patent No. 5,552,984).

The Rejection of Claims 1-26 under 35 U.S.C. § 112, first paragraph

Independent claim 1 recites "an evaluation-and-control-unit for comparing the information data of the installation components with the picture data of the real installation, for identifying identified components in the picture data as respective ones of the installation components, for deriving hypotheses regarding the identified components in the picture data, and for generating the respective identified ones of the installation components in the virtual installation model."

The grounds of rejection in item 2 of the present Office Action state that "the specification does not disclose an algorithm or technique for comparing component information data with real picture data. Neither the operation of the **evaluation and control** unit, nor the process of **identifying components in picture data**, nor the claimed **deriving hypotheses**, is sufficiently described in the specification to allow one skilled in the art to make and/or use the invention."

Independent claim 13 recites a step of "comparing information data of installation components of a component library with the picture data of the real installation to identify at least one of the installation components in the picture data as an identified installation component." Independent claim 25 recites "a processing unit to compare the components of the facility in the picture data with the predefined representations of the components of the facility in order to identify identified components as respective ones of the components of the facility."

The grounds of rejection on page 3 of the present Office Action state that "the specification does not disclose an algorithm or technique for performing the comparison or identifying the components." In addition, the grounds of rejection state that the specification "does not disclose the process for comparing components sufficient to allow one skilled in the art to make and/or use the invention."

Applicants submit that an exemplary embodiment of the "algorithm", "technique", or "process" for comparing information data of installation components with picture data of a real installation and for identifying components in the picture data is described on page 15, ln. 19, to page 18, ln. 21, of the present application.

For example, page 16, ln. 2-11, teaches with reference to Fig. 10 that picture data 201, e.g., digital pictures, and image information 202, 203, 204, 205 associated therewith is stored in an image memory 20. As shown in Fig. 1, the image memory 20 receives picture data of the real plant 1 via the image recording system 3. Thus, the picture data 201 in the image memory 20 is an exemplary embodiment of the "picture data of a real installation" recited in claim 1. Further,

the memory 6 includes prefabricated or predetermined components 61, e.g., tank, valves, piping, etc. These components 61 are exemplary embodiments of the "installation components" recited in claim 1.

Page 17, ln. 20, to page 18, ln. 3, teach that the information contained in the picture data 201 is converted into a so-called prepared source 51, in which either the pixels 203 of the image 202 or the CAD elements 205 of the CAD drawing 203 are converted into geometric elements 53 (e.g., point 55, line 56, curve 57, ..., 58). Based on these geometric elements 53, the evaluation-and-control unit 5 then attempts to assign the selected components 61 to the picture data 201. In other words, as taught on page 16, ln. 6-9, and on page 18, ln. 15-17, geometric elements 53 of a component 61 are matched (or compared) with geometric elements 53 of the prepared source 51.

Thus, the specification teaches, by way of preferred embodiments, how the installation components are compared with the picture data of a real installation and how components in the picture data are identified.

Further, page 13, ln. 8-17, teach with reference to Fig. 8 that structural data 23 shown in the left display area includes, for example, information on the size and the connection possibilities of a tank 16a. This structural data is evaluated when the tank 16a is assigned to the digital picture data (in the manner described above) and is used, for example, to generate hypotheses as to the nature of an additional component and/or the location of an additional component.

Thus, the specification teaches how hypotheses are derived, as recited in claim 1.

For at least these reasons, Applicants submit that claims 1-26 are enabled, and respectfully request withdrawal of the rejection of the claims under 35 U.S.C. § 112, first paragraph.

The Rejection of Claims 1-26 under 35 U.S.C. § 103(a)

Fig. 1 of the present application shows a block diagram of a device for generating a virtual installation model. An image recording system 3 records images of a real installation 1, which are stored in a memory 20 of a device 22 for generating a virtual installation model 2. Picture data 4 of the real installation 1 is supplied to an evaluation-and-control-unit 5. In addition to the picture data 4, the evaluation-and-control-unit 5 processes component data 13 of a component library 6, which is stored in a second memory 21 of the device 22. The second memory 21 of the component library 6 includes a partial memory area 24 for storing structural information 23 of the installation components 6. Output data 27 at the output of the evaluation-and-control-unit 5 serves as input data for the virtual installation model 2. A screen or display unit 8 displays the real installation 1, the installation components 6, and the generated virtual installation model 2.[1]

The central element of the device 22 for generating the virtual image 2 of the real installation 1 is the evaluation-and-control-unit 5. The evaluation-and-control-unit 5 performs an

[1] See application text, page 8, ln. 2-17

image analysis, wherein geometric information contained in the digital picture data 4 is identified and matched with geometric information in the component information 13.[2]

Independent claim 1 is directed to a device for generating a virtual installation model as an image of a real installation, which comprises, among other things, "an evaluation-and-control-unit for comparing the information data of the installation components with the picture data of the real installation".

The grounds of rejection for claim 1 state on page 5 of the present Office Action that Marks does not explicitly teach comparing component information with real picture data. However, the grounds of rejection continue by stating that Asar teaches a system and method for identifying components by comparing component information data with real picture data. The grounds of rejection also state that Marks does not explicitly teach virtual components, but that Crandall teaches generating a virtual model of a real system using virtual components from a library of components representing the total virtual system. The grounds of rejection then propose to combine the teachings of the Marks, Asar, and Crandall references so as to arrive at the invention recited in claim 1.

In an exemplary embodiment of the Marks reference, a three-dimensional model of a room is created, and the difference between a first approximate model and a second, more accurate model is displayed. In one embodiment, a computer system is coupled to a display and

[2] See application text, page 8, ln. 18-22

a digital camera. A picture of a room and its furnishings (e.g., a kitchen 140, as shown in Fig. 1) is taken and shown on the display (such as display device 120 in Fig. 1). A user then creates a 3D model of the room by creating wireframe primitives that approximate the shape, size and location of the objects in the picture. The primitives are displayed on top of the picture. The user then creates a second 3D model that is more accurate by adjusting each primitive to more accurately match the location and size of each object in the picture. Rubber banding lines between the first 3D model and the second 3D model are then displayed to help the user see where a vertex was moved.[3]

The Asar reference shows in Fig. 1 a vision comparison inspection system 2 intended for use in a printed circuit assembly production line 3. The production line 3 has a plurality of processing locations and a system of conveyors 4 for transporting circuit assemblies between processing locations. The inspection system 2 is incorporated into the production line 3 in order to inspect printed circuit assemblies 54 for defects introduced during the installation of components at the various processing locations.[4] Therein, a stored image of a known good printed circuit assembly and an image of the printed circuit assembly under test 54 are alternately displayed on a display device in order to visually identify defects in the printed circuit assembly under test.[5]

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[3] See Marks reference, col. 2, ln. 65, to col. 3, ln. 12

[4] See Asar reference, col. 9, ln. 55, to col. 10, ln. 18

[5] See Abstract of Asar reference

The Crandall reference is directed to a diagnostic method and apparatus that locates faulty components in complex real systems.[6] Referring to Figs. 1A and 1B, a virtual diagnostic system (VDS) 10 integrates a plurality of virtual components 12 to form a virtual model 14. The virtual model 14 parallels a real system 18 under test. The VDS 10 connects real system inputs 22 to an input 24 of the real system 18 and to an input 23 of the virtual model 14. A comparing device 26 compares an output 28 of the real system 18 to an output 32 of the virtual model 14. Diagnostics are performed on an output 34 of the comparing device 26.[7]

The VDS 10 compares the functional behavior of the real system 18 to the functional behavior of the virtual model 14. Assuming that the virtual model 14 adequately models a properly functioning real system (or models a malfunctioning real system), mismatch detected by the comparing device 26 represents functional failure of the real system 18 under test.[8]

Regarding the proposed combination of the Marks reference with the Asar reference, the Asar reference alternates images on, e.g., a video display monitor 92 (see Fig. 1) in order to identify defects on a printed circuit assembly 54. It is not apparent what images are to be alternated on, e.g., Marks' display device 120, in order to create Marks' 3D model and why. Indeed, the Marks reference is not even concerned with identifying defects in, e.g., the kitchen 140, for which the 3D model is created. Marks' method is a self-sustaining method of creating a

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[6] See Crandall reference, col. 1, ln. 65-66

[7] See Crandall reference, col. 2, ln. 65, to col. 3, ln. 6

[8] See Crandall reference, col. 3, ln. 7-13

3D model and, thus, does not need any alternating of any images in order to be functional. It is unclear why a person skilled in the art would have alternated, e.g., the 3D models, or the room images 370 (see Fig. 3), or the 3D model with the room image 370, on the display device 120, if all that person wanted to achieve was to create a 3D model of the room. By the same token, it is not apparent in what step of Asar's method of alternating images on the video display monitor 92 a 3D model of a printed circuit assembly should be created and why. Asar's method is completely functional by alternating the images of the printed circuit assemblies in order to identify defects on the printed circuit assembly 54. A 3D model of printed circuit assemblies is not needed to achieve that goal.

Regarding the proposed combination of the Marks reference with the Crandall reference, it is unclear how or why a person skilled in the art would have compared the functional "behavior" of a real system (e.g., a room) to the functional "behavior" of a virtual model modeling the room (e.g., a 3D model of the room). A "room" is a *static* arrangement of physical, separate objects (such as the kitchen 140). A *static* arrangement of physical, separate objects, however, does not exhibit a functional behavior or functional interplay between these objects, which could then be compared with the behavior of a virtual model of that static arrangement.

On the other hand, the Crandall reference compares the output 28 of the complex real system 18 (such as an airplane or nuclear core) to the output 32 of the virtual model 14 of the real system 18 in the comparing device 26. By comparing the outputs 28 and 32, the functional behavior of the real system 18 is compared to the functional behavior of the virtual model 14 so that faulty components in the real system 18 can be detected. The Marks reference, on the other

hand, does not even aim to detect faulty "components" or objects in the kitchen 140. Rather, the Marks reference merely aims to create a 3D model of the "components" or objects. Thus, there is no teaching or suggestion of any output of the kitchen image 370 that could be compared with any output of the 3D model of the kitchen in order to draw conclusions about the functional behavior of the kitchen 140.

Indeed, the grounds of rejection themselves fail to point to specific citations in the references where such a motivation to combine the three references is allegedly disclosed. Further, it is not apparent how or why the motivation suggested by the Examiner ("creating a 3D (virtual) model of physical objects provides more efficient detection of discrepancies between the model and the actual image") would have motivated a person skilled in the art to combine the Marks, Asar, and Crandall references in the specific manner claimed. Marks teaches creating a 3D model of a room; Asar teaches inspecting printed circuit assemblies by alternating displays of images; and Crandall teaches detecting faulty components in a real system by comparing the functional behavior of the real system to the functional behavior of a virtual model modeling the real system. Given the disparate nature of these teachings, one skilled in the art would not have had any guidance on which elements to select and which to discard from these three references.

The only source of record motivating the provision of "an evaluation-and-control-unit for comparing the information data of the installation components with the picture data of the real installation", as recited in claim 1, is Applicants' own application text. The application text, however, is not part of the prior art and, thus, cannot be used, in hindsight, against Applicants.

For at least these reasons, Applicants submit that independent claim 1 is patentable over the prior art made of record. The dependent claims 2-12 are patentable at least by virtue of dependency from claim 1.

Independent method claim 13 recites a step of "comparing information data of installation components of a component library with the picture data of the real installation ...." Therefore, Applicants submit that patentability arguments analogous to those presented in connection with the patentability of claim 1 apply to claim 13 with equal force. The dependent claims 14-24 are patentable at least by virtue of dependency from claim 13.

The grounds of rejection for independent claim 25 state that this claim is "rejected using the same reasoning as previously cited above." Therefore, Applicants submit that patentability arguments analogous to those presented in connection with the patentability of claim 1 apply to claim 25 with equal force. Dependent claim 26 is patentable at least by virtue of dependency from claim 25.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Filed concurrently herewith is a Petition (with fee) for an Extension of Time of one month. Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this application, and any required fee for such extension is to be charged to Deposit Account No. 19-4880. The Commissioner is also authorized to charge any additional fees under 37 C.F.R. § 1.16 and/or § 1.17 necessary to keep this application pending in the Patent and Trademark Office or credit any overpayment to said Deposit Account No. 19-4880.

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